CLAIMS

What is claimed is:

1. A rotary electric motor comprising:

a stator comprising a plurality of separate integral electromagnet core segments disposed coaxially about an axis of rotation to form an annular cylindrical stator ring bounded by an inner and outer diameter;

each core segment comprising a center pole and two lateral poles, the center pole integrally joined on each axial side thereof by a linking portion to a respective lateral pole to form an axial row of stator poles; and

a cylindrical annular permanent magnet rotor concentric with the stator and separated therefrom by a radial air gap.

2. A rotary electric motor as recited in claim 1, wherein the stator core segments are affixed to a non-ferromagnetic support structure and thereby distributed in the stator ring without ferromagnetic contact with each other.

3. A rotary electric motor as recited in claim 1, wherein each of the stator poles has a pole face surface area at the radial air gap; and each stator core segment further comprises:

a winding formed on each linking portion and connected to develop, when energized with current, one magnetic polarity in each of the lateral poles and an opposite magnetic polarity in the center pole, and wherein reversal of direction of current flow through the windings effects reversal of magnetic polarities of the poles.

4. A rotary electric motor as recited in claim 3, wherein the surface area of the center pole face of a stator core segment is different from the surface area of a lateral pole face of the respective core segment.

5. A rotary electric motor as recited in claim 3, wherein:

the plurality of stator core segments have substantially the same pole configurations.

6. A rotary electric motor as recited in claim 5, wherein the core segments are structurally positioned to form two annular sets of lateral poles and one annular set of center poles, each set comprising a respective pole in each of the core segments; and

the poles of each set are substantially axially coextensive.

7. A rotary electric motor as recited in claim 1, wherein the rotor comprises a plurality of axial rows of permanent magnets disposed circumferentially along the air gap.

8. A rotary electric motor as recited in claim 7, wherein each axial row comprises a center permanent magnet of one magnetic polarity and, at each axial side thereof, a lateral permanent magnet of a magnetic polarity opposite to the polarity of the center magnet.

9. A rotary electric motor as recited in claim 7, wherein the magnetic polarities of the permanent magnets of each successive row in the circumferential direction are of alternate magnetic polarity.

10. A rotary electric motor as recited in claim 7, wherein each of the permanent magnets of the rotor has a surface area at the air gap extending in the axial and circumferential directions, the surfaces of the magnets of each row being coextensive in the circumferential direction, and the surface of each permanent magnet of a row being coextensive in the axial direction with the surface area of a corresponding magnet in each of the other rows.

11. A rotary electric motor as recited in claim 10, wherein the length of a center permanent magnet in the axial direction is different from the axial length of a lateral permanent magnet.

12. A rotary electric motor as recited in claim 10, wherein the axial length of all lateral permanent magnets are substantially equal and less than the axial length of the center permanent magnets.

13. A rotary electric motor as recited in claim 10, wherein the rotor further comprises:

a back iron ring upon which the permanent magnets are mounted; and

a nonmagnetic outer ring within which the permanent magnets and back iron ring are housed.

14. A rotary electric motor as recited in claim 13, wherein in the back iron ring comprises a continuous ferromagnetic material.

15. A rotary electric motor as recited in claim 13, wherein the back iron ring comprises a plurality of discontinuous segments, each segment having mounted thereon a corresponding axial row of permanent magnets.

16. A rotary electric motor as recited in claim 15, wherein each back iron segment comprises two separated segment portions, each segment portion bridging the center permanent magnet and a respective lateral permanent magnet of the corresponding axial permanent magnet row.

17. A rotary electric motor as recited in claim 13, wherein each permanent magnet is a magnetic dipole having one magnetic polarity at a surface at the air gap and the opposite magnetic polarity at a surface facing the back iron ring.

18. A rotary electric motor as recited in claim 13, wherein adjacent permanent magnets are in contact with each other.

19. A rotary electric motor as recited in claim 17, wherein adjacent axial permanent magnet rows are separated from each other.

20. A rotary electric motor as recited in claim 17, wherein adjacent permanent magnets of each axial row are separated from each other.

21. A stator for a rotary electric motor comprising:

a plurality of separate integral electromagnet core segments disposed coaxially about an axis of rotation to form an annular cylindrical stator ring bounded by an inner and outer diameter;

each core segment comprising a center pole and two lateral poles, the center pole integrally joined on each axial side thereof by a linking portion to a respective lateral pole to form an axial row of stator poles; and

a winding formed on each linking portion and connected to develop, when energized with current, one magnetic polarity in each of the lateral poles and an opposite magnetic polarity in the center pole, and wherein reversal of direction of current flow through the windings effects reversal of magnetic polarities of the poles.

22. A stator as recited in claim 21, wherein each pole has a pole face surface area extending in the axial and circumferential directions.

23. A stator as recited in claim 22, wherein the surface area of the center pole face of a stator core segment is different from the surface area of a lateral pole face of the respective core segment.

24. A cylindrical annular permanent magnet rotor for a rotary electric motor comprising:

a plurality of axial rows of permanent magnets disposed circumferentially about an axis of rotation, each axial row comprising a center permanent magnet of one magnetic polarity and, at each axial side thereof, a lateral permanent magnet of a magnetic polarity opposite to the polarity of the center magnet.

25. A rotor as recited in claim 24, further comprising:

a back iron ring upon which the permanent magnets are mounted; and

a nonmagnetic outer ring within which the permanent magnets and back iron ring are housed.

26. A rotary electric motor as recited in claim 25, wherein the back iron ring comprises a plurality of discontinuous segments, each segment having mounted thereon a corresponding axial row of permanent magnets.

27. A rotary electric motor as recited in claim 26, wherein each back iron segment comprises two separated segment portions, each segment portion bridging the center permanent magnet and a respective lateral permanent magnet of the corresponding axial permanent magnet row.

28. A rotary electric motor as recited in claim 25, wherein each permanent magnet is a magnetic dipole having one magnetic polarity at a

surface at the air gap and the opposite magnetic polarity at a surface facing the back iron ring.